Algebra 2

Chapter 5

*This lesson is designed to connect the standard form of a quadratic to the factored form. Students are led through the development of factoring quadratic polynomials by first exploring the relationships between the factors of the polynomial and its roots or x-intercepts. They also investigate the relationships among the axis of symmetry of the quadratic polynomial, the roots of the polynomial, and the minimum or maximum value of the quadratic polynomial.*

Part A

Each student is given one equation and asked to graph based on the process they have been taught. (Find the vertex, -intercept and axis of symmetry, fill in with points from a table)

They are asked to draw on a full size paper clearly labeling the equation and all important points.

These are posted in order around the room, preferable on two white boards as to provide enough viewing space.

As the students finish, they can begin to walk the “gallery”. The first few students to finish can be given a “challenge” problem to factor (one with a 1) until more graphs are hung.

Students begin the walk by themselves. After giving them time, you may gather the students at the board in small groups for discussion and aid in getting their thoughts into mathematic statements. As the students finish the questions, allow them time to gather in groups and collaborate.

Bring the whole class back together and quickly go through the main topics of the walk: x-intercepts, difference of squares, unfactorable equations, where the vertex is located in relation to the x-intercepts, etc. Keep this brief and lively, details and notes will follow in the next part.

Part B

Hand out “think about this situation” and let the students read and answer the top individually. Have them quickly answer with a partner and summarize as a class (5 minutes) Using an overhead, give notes on the zero product property as outlined on paper. Walk them formally through finding the average of the intercepts to find the x value of the vertex and how to use that to calculate the y value or in this case the value of the maximum height.

Part C

Practice problems as given.

**A. GALLERY WALK. Quadratic Equations and their graphs in Standard and Factored forms**

**I. Factor the following quadratic equations.**

**II. When you are finished factoring the above equations, start to walk around the room to compare your factored form with the equations posted in standard form and their GRAPHS.**

1) Explain how graph q(x) is different from the other graphs? How is that shown in the factored form?

2) How is n(x) factored form different and also how is the graph different from the other forms?

3) What are the x-intercepts of graph g(x)? Summarize how you would find them if you were given only the factored form?

4) Find a way to relate the information from the factored form to information on the graph.

5) If given only the factored form of a quadratic equation, how could you find pieces of information to aid in graphing the equation?

**B. GALLERY WALK continued. Quadratic Equations and their graphs in Standard and Factored forms**

Think about this situation.

Examine the graph of the function giving a gymnast’s height in feet above a trampoline at time *t* seconds. Following are three questions that can be asked about this situation.

* When will the gymnast reach maximum

height?

* What will that height be?
* When will she return to the trampoline

surface?

***With a partner discuss and write your thoughts on the following two questions.***

a) How does the graph show estimates for answers to all the three key questions above?

STOP.

Factor the quadratic equation.

At what time does the gymnast return to the trampoline? When h(t) = \_\_\_\_\_\_\_\_\_\_\_\_

Set the factored form of the equation = to 0. Find the x –intercepts.

How would you find the time the gymnast reached the maximum height using only the x-intercepts?

How would you find the actual height?

C. Graph and label each equation on graph paper. Include x-intercepts and vertex on the graph.